



IOWA

PROFILES IN soil health

Tim Smith
Eagle Grove, Iowa
800 acres
Crops: corn, soybeans
Planting: strip-till
Cover: cereal rye



unlock the
SECRETS
IN THE
SOIL

MRBI Conservation Practices Improving Soil Conditions, too.

Eagle Grove farmer Tim Smith's participation in a USDA conservation program designed to reduce nutrient and sediment loading into local waterways – and eventually the Mississippi River – is also improving the health of his soils using fewer disturbing activities such as deep tillage, over-fertilizing, and keeping living roots in the ground longer through cover crops.

Smith lives on the family Century Farm where he grows about 320 acres of corn and soybeans. He also rents another 500 surrounding acres. His farmland sits in the Boone River Watershed, where the water flows downstream to the Des Moines River, then to the Mississippi River, and eventually to the Gulf of Mexico.

The Mississippi River's elevated levels of nutrients and sediment are blamed for the weakening



A cereal rye cover crop grows into soybean stubble on Tim Smith's Century Farm near Eagle Grove.

environmental condition of the Gulf of Mexico, where the world's second largest hypoxic area – or Dead Zone – has increased in duration and frequency over time.

The Mississippi River Basin Healthy Watershed Initiative (MRBI) is led by the Natural Resources Conservation Service (NRCS) and involves 13 states – from Minnesota to Louisiana. It launched

in 2010 to help reduce agricultural impacts on the Gulf's Dead Zone.

MRBI is one of the first federal programs to implement conservation systems in targeted watersheds. Farmers in selected MRBI watersheds can choose from a list of practices to help improve water quality, provide wildlife habitat, and reduce soil erosion. MRBI is an attractive program for farmers because available practices are typically suited for local conditions and incentive payments are higher than most other programs. There are currently 18 MRBI watershed projects in Iowa.

Smith makes changes to his farm

Bruce Voigts, MRBI Coordinator for the Boone River Watershed, suggested Smith make changes to his nutrient management plan, tillage activities, and to add cover crops to parts of his farm to help prevent sediment and nutrients from leaving his property. After careful thought and online research, Smith decided to implement the practices that Voigts suggested to about 90 percent of his farm.

He said family factored into his decision. "I don't want to be responsible for discharging excess nitrate from my tile," said Smith. "My daughter lives in the Des Moines area and she drinks the water that my tile lines discharge. I don't want the water to be harmful to her or others."

The practices Smith installed through MRBI are not limited to improving water quality. Smith is encouraged by the way strip-till, nutrient management and cover crops are improving soil conditions, and helping to produce more dependable row crop yields through challenging weather conditions.

Strip-till

Smith shifted his tillage system from ridge-till which provides some, but not optimal soil erosion control – to strip-till, a less soil disturbing method where a farmer plants into a narrow-width tilled strip



Tim Smith's strip-till equipment.

that is typically created in the fall. Barb Stewart, state agronomist for NRCS in Des Moines, says strip-till is particularly effective in the poorly drained wet soils of north central Iowa.

"One reason strip-till has grown in popularity is that farmers can complete field operations in just two passes – making strips in the fall and simultaneously planting and applying nitrogen fertilizer in the spring," she said. "Where no-till is not feasible, strip-till is the next best practice for reducing soil erosion."

Rick Bednarek, state soil scientist with NRCS in Iowa, says the minimal amount of soil disturbance with strip-till helps to sequester carbon in the soil which helps keep microbes, including fungi, alive to form soil organic matter.

Smith says the most noticeable thing is all of the earthworm holes. "When you till the soil, you destroy that pattern," he says. "Our soil is not a chemistry lab. Without beneficial soil organisms, NP&K are unable to reach the crop through roots. It takes micro-organisms digesting the nutrients to make them available to the plant to be used."

Nutrient Management

Iowa NRCS requires MRBI participants to implement a Nutrient Management Plan, which is not required

in all states. "I think requiring a Nutrient Management Plan is an excellent idea," says Smith.

His plan states he apply no more than 150 pounds of nitrogen, with no fall application. "That didn't bother me because I don't know that I have ever applied more than that," he said. "With my change to strip-till, I don't apply nitrogen in the fall, only sidedressing in the spring."

Water is not the only natural resource affected by over-applying chemicals. Soils can also be disturbed chemically or biologically through the misuse of fertilizers. "Over-application of these materials can disrupt the delicate relationship between plants and soil organisms," says Bednarek. "When soils are most naturally productive, farmers are most profitable."

New Nutrient Management Plans in Iowa will follow an updated standard, which Iowa NRCS rolled out in October 2013. Visit the Nutrient Management web page on the Iowa NRCS website for details.

Cover Crops

In fall 2011 Smith aerial applied cover crops for the first time, perhaps the most dramatic change to his farm, he says, since his father traded his moldboard plow for a chisel plow.

Like many Iowa farmers, Smith applies cereal rye which overwinters, sequesters nitrogen, and helps reduce soil erosion. "I like cereal rye because you can see it coming up quickly," he said. "It grows well. I think that's where farmers should start with cover crops."

In the future, Smith says he would like to try tillage radishes or a cover crops mix to gain even more soil health benefits such as water infiltration. "I would like to have seed on hand to be flexible, depending on weather conditions," he said.

Practices Are Helping

Watershed project coordinators began comparing nitrate levels in water leaving Smith's tile outlets to



Cereal rye is visible through corn rows as Tim Smith harvests corn. Smith aerial applied his cover crop in early September 2013.

nitrate levels in adjacent Eagle Creek in spring 2011, prior to practice implementation. Tests show peak levels of nitrate in water leaving Smith's tile in 2011 were slightly higher than creek water. However, after practice implementation, peak levels in Smith's tile outlets were half those in Eagle Creek from tests conducted in 2012 and 2013.

"This indicates to me that the practices are working," said Voigts, "particularly the cereal rye cover crop that nabs nitrates when the plants aren't there to use them."

Smith feels the practices are also improving soil conditions. "Healthier soil long-term means more crop sustainability and better yields with fewer inputs," he said.

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